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## Systemic Steroids in COPD Exacerbation

ABSTRACT & COMMENTARY

**Source:** Niewoehner DE, et al. Effect of systemic glucocorticoids on exacerbations of chronic obstructive pulmonary disease.

*N Engl J Med* 1999;340:1941-1947.

While systemic corticosteroids have clearly been shown to be efficacious for acute asthma exacerbations, the role of corticosteroids is less certain for acute chronic obstructive pulmonary disease (COPD) exacerbations. This Veterans Affairs cooperative study examined hospitalized patients with COPD exacerbations who were at least 50 years of age, had a history of smoking, and had no other medical problems. Patients already taking systemic steroids upon admission were not eligible. Within 12 hours of ED presentation, subjects were randomized to receive either two weeks of corticosteroids (methylprednisolone 125 mg 4 times a day for 3 days, then tapering off from 60 mg daily over 2 weeks), eight weeks of corticosteroids (methylprednisolone 125 mg 4 times a day, then prednisone tapering off from 60 mg daily over 8 weeks), or placebo. All subjects received antibiotics and inhaled  $\beta_2$ -agonists, ipratropium bromide, and triamcinolone. Treatment failure was defined as need for mechanical intubation, readmission for COPD, intensification of COPD therapy, or death.

Over two years, 271 subjects were enrolled. Treatment failure was significantly less in the two steroid groups than in the placebo group at 30 days (23% vs 33%) and at 90 days (37% vs 48%). The failure rate at six months did not differ between groups. There were no differences in failure rate between the two-week and eight-week regimen groups. Steroid-treated patients had a shorter hospital stay than placebo-treated patients (8.5 vs 9.7 days), although the study protocol required at least a three-day hospitalization. Fifteen percent of subjects receiving steroids required therapy for hyperglycemia, compared to 4% of subjects receiving placebo. Niewoehner and colleagues conclude that steroid therapy is of moderate benefit among patients hospitalized for COPD exacerbation.

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■ COMMENT BY DAVID J. KARRAS, MD, FAAEM,  
FACEP

Much of our current bias toward using steroids for COPD therapy in the ED is an extrapolation of the compelling evidence that steroids benefit patients with asthma exacerbations.<sup>1</sup> In actuality, the role of systemic corticosteroids for management of COPD exacerbation is not as clearly defined. Some studies have found no short-term benefit from steroid therapy for COPD exacerbation,<sup>2</sup> while others have found steroids to be of modest benefit.<sup>3,4</sup> All the studies have been relatively small. A meta-analysis of patients with stable COPD showed some benefit from steroid therapy.<sup>5</sup>

Although corticosteroids do not promptly benefit patients with acute COPD exacerbations, studies such as this large trial do show a longer-term advantage to systemic steroid administration. It is therefore reasonable to start such therapy in the ED for patients with moderate-to-severe COPD exacerbation, with important caveats. Niewoehner et al administered steroids only to hospitalized patients, who were presumably sicker than the larger population of COPD patients in the ED. The high incidence of medication-related hyperglycemia is cause for concern. The safety of fast-taper or no-taper steroid dosing (typically used for asthma exacerbations) is not

addressed and should not be assumed. Anticholinergic and steroid inhalers, used by all patients in this study, have far fewer side-effects than systemic steroids and should be considered standard-of-care for management of COPD exacerbations. ❖

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# Utility of Abdominal X-ray in Appendicitis

## ABSTRACT & COMMENTARY

**Source:** Rao PM, et al. Plain abdominal radiography in clinically suspected appendicitis: Diagnostic yield, resource use, and comparison with CT. *Am J Emerg Med* 1999;17:325-328.

Appendicitis is a common diagnosis in emergency medicine, and carries a lengthy differential diagnosis. Diagnostic workup often includes the use of abdominal radiographs, but clinical experience tells us that such x-rays often yield little additional or specific information. Rao and colleagues, in a retrospective chart review of patients admitted through the ED for suspected appendicitis, sought to define the diagnostic yield and cost per correct diagnosis made via plain abdominal radiography.

Between 1992 and 1996, 821 patients were admitted through the ED with suspected appendicitis. Patients ranged in age from 1 to 89 years, with a mean age of 29 years. Slightly more than half of the patients were male. A total of 524 patients (64%) had pathologically confirmed appendicitis, 114 of whom had appendiceal perforation at the time of laparotomy. Of the original group of 821 patients, 642 had abdominal radiographs per-

formed, 396 of whom had appendicitis. Abnormal findings were noted in 51% and 47% of patients with and without appendicitis, respectively ( $P = 0.195$ ). No specific radiographic finding was more likely to be found in patients with appendicitis compared to those without appendicitis. Specific radiographic diagnoses were suggested in 10% of patients; more than half of these proved incorrect compared to final clinical diagnoses. Cost analysis yielded a cost of \$1,593 per correct diagnosis by plain abdominal radiography, vs. a cost of \$270 per correct diagnosis by appendiceal CT.

Rao and associates conclude that plain radiography uncommonly suggests a specific and correct diagnosis in patients admitted for suspected appendicitis, and when it does, it often fails to correlate with the final clinical diagnosis. Based upon their clinical and financial analysis, Rao et al state that the use of plain abdominal radiography in this set of patients cannot be medically or financially justified.

#### ■ COMMENT BY FREDERIC KAUFFMAN, MD, FACEP

All of us have learned that the classic patient with appendicitis presents first with periumbilical pain, followed by nausea, right lower quadrant pain migration, vomiting, and fever. Unfortunately, not all patients present in a classic fashion. Misdiagnosis, or delay in diagnosis, can lead to appendiceal perforation, abscess formation, and even death. As such, any adjunct to bedside evaluation that enhances diagnostic accuracy would, indeed, be very useful to patient and clinician alike.

The typical diagnostic evaluation of patients with suspected appendicitis traditionally has included history, physical examination, complete blood count, and plain abdominal radiography. Rao et al hypothesized that abdominal radiographs would yield little in patients with suspected appendicitis, and indeed they conclude just that. And though my clinical experience concurs with such a conclusion (just as it does with complete blood counts), I find it exceedingly difficult to interpret the specific data presented by the authors. For example, possible ureteral stone is listed twice in the same table on radiological impressions, with different numbers of patients for each listing. The authors differentiate between radiographic findings and overall radiological impressions; possible appendoliths occur in 48 patients as radiographic findings, but in only 24 patients as overall radiographic impressions.

As technology evolves with improvements in CT and ultrasonography, no doubt plain abdominal radiography will fall by the wayside. Confusion over data points and their analysis prevents me from using this study to invalidate totally the role of abdominal radiographs in

patients with suspected appendicitis, though I believe that day is coming. In the meantime, let's not get so hung up with diagnostic testing that we lose sight of our patients. Strong clinical suspicion of appendicitis warrants exploratory laparotomy, not a multitude of time-consuming tests. For those patients with less classic presentations, I believe that the message should be, "Don't hang your hat on a normal, or even abnormal, abdominal radiograph." ❖

## Outpatient Treatment of UTIs in the Young Child: The Time Has Come

ABSTRACT & COMMENTARY

**Source:** Hoberman A, et al. Oral versus initial intravenous therapy for urinary tract infections in young febrile children. *Pediatrics* 199;104:79-86.

Is it safe and effective to treat febrile young children with urinary tract infections (UTIs) as outpatients with oral antibiotics? Hoberman and colleagues provide us with very useful data in answer to this clinical question. In a study involving four pediatric EDs, 306 children ages 1-24 months with fever and UTI were randomized to be treated with oral cefixime for 14 days (double dose on day 1), or intravenous (IV) cefotaxime for three days and then oral cefixime to complete a 14-day course of therapy. The short-term outcomes studied were sterilization of the urine at ~24 hours and time to defervescence; the long-term outcomes studied were incidence of reinfection and incidence and extent of renal scarring documented at six months by DMSA scan. Children between 4 and 8 weeks of age who were randomized to the oral therapy treatment arm ( $n = 4$ ) were admitted to the hospital on oral therapy, observed, and discharged when afebrile to complete the 14-day course of therapy. Also, children randomized to the oral treatment arm who had vomiting that interfered with oral therapy were observed and given a trial of oral or IV fluids along with the trial dose of cefixime. Only one child randomized to the oral arm was ultimately excluded from the trial because of refractory emesis.

The treatment groups were comparable in all relevant aspects, including coexistent bacteremia rates (3.4% in oral group and 5.3% in IV group) and prevalence of pyelonephritis (65% in the oral group and 57% in the IV group). As you would expect, *Escherichia coli* was the

causative pathogen in 97% of the infections. Short-term outcomes: 1) all of the children had negative repeat urine cultures (and blood cultures) at ~24 hours; and 2) mean time to defervescence was similar between the two groups. Long-term outcomes: 1) the incidence of reinfection was similar between the groups (4.6% in the oral groups and 7.2% in the IV group); and 2) renal scarring at 6 months was present in 9.8% of children treated orally and 7.2% in children treated IV ( $P = 0.21$ ), and the extent of renal scarring was 8% in both groups.

#### ■ COMMENT BY LEONARD FRIEDLAND, MD

These data clearly support the decision to treat most young febrile children with a suspected UTI (and pyelonephritis) as outpatients with oral antibiotics. I state most, as this choice is not appropriate for the toxic appearing child, the infant younger than 8 weeks of age with whom bacteremia and increased risk for meningitis must also be a concern, and the child with vomiting that prevents oral therapy. These data also show that children admitted for a short course of IV therapy followed by oral therapy have good short-term and long-term outcomes. Another finding suggests that obtaining blood cultures in febrile young children with UTI is not necessary, as the yield is low and all repeat cultures were sterile after 24 hours of UTI therapy. When considering empiric therapy, the initial choice of a third-generation cephalosporin such as cefixime is a “big gun,” and once identification and sensitivities are known, the antibiotic selection should be narrowed. The incidence of renal scarring was fortunately low in these patients and likely secondary to vigilance in looking for a UTI as the source in a febrile infant, early antibiotic therapy, and close follow-up. ❖

## Special Feature

# New Diagnostic Approaches to Pulmonary Embolism

*By Stephanie B. Abbuhl, MD, FACEP, and Raquel M. Schears, MD, MPH*

**P**ulmonary embolism (pe) continues to be a difficult diagnostic challenge for emergency medicine physicians. The lack of a reliable, noninvasive method for detection, coupled with nonspecific patient presentations and examination findings, results in the majority of PE cases being diagnosed postmortem. It is estimated that 650,000 cases of PE occur annually in the United

States, with PE as the primary cause of death or as a significant contributor in 200,000 deaths, making this entity the third most frequent cause of death overall in hospitalized patients.<sup>1</sup>

The current standard of care in the initial ED evaluation of patients with suspected PE is radionuclide ventilation-perfusion (VQ) scanning of the lung. Unfortunately, VQ scans confirm or exclude PE in less than one-third of all patients with PE.<sup>2</sup> The remainder of patients fall into a non-diagnostic category usually requiring further testing to make a diagnosis.

While pulmonary angiography has been the gold standard for the diagnosis of PE, it is far from the ideal test. It is an invasive test associated with a 0.5% mortality risk and a serious morbidity risk of about 1%.<sup>2</sup> In addition, angiography requires intravenous contrast, is not always available, requires significant radiologic expertise, and can be associated with combined technical and professional fees as high as \$8500.

There have been recent advances in spiral CT, MRI, and D-dimer testing that suggest exciting new roles for these modalities in the ED evaluation of PE. The advantages and disadvantages of these new approaches will be reviewed.

### D-Dimer Assays

Clot formation anywhere in the body activates the endogenous fibrinolytic system. When cross-linked fibrin is broken down by plasma, D-dimers can be measured by either an enzyme-linked immunosorbent-assay (ELISA) or a latex agglutination test. The quantitative ELISA test has been the most promising, with sensitivities for thromboembolic disease reported as high as 97-100% (CI 92-100).<sup>3</sup> Unfortunately, the standard ELISA test has been time consuming compared to the rapid, but less sensitive, latex agglutination assay. Recently, however, a rapid ELISA assay has been developed that may expand the role of D-dimer testing in the ED.<sup>3</sup> The biggest disadvantage to the D-dimer assay is its lack of specificity (ranging from 15% to 70%).<sup>4,5</sup> D-dimer levels can be elevated due to numerous causes, including surgery, infection, cancer, and liver disease.

Because D-dimer results appear less sensitive but non-specific for venous thromboembolic disease, a positive D-dimer level is of little value, but a negative test is potentially useful to exclude disease (high negative predictive value). In a recent outcome study by Ginsberg and colleagues, 1177 consecutive patients with suspected PE underwent an evaluation that included an assessment of pretest probability, a rapid bedside D-dimer test, VQ scan, and bilateral ultrasonography of the lower extremities.<sup>6</sup> All patients were followed-up for three months to assess the adequacy of the testing strategy using reason-

able definitions of PE and deep vein thrombosis (DVT). Overall, the D-dimer assay showed a sensitivity of 85% with a specificity of 68%. However, in a subgroup analysis, patients with low pretest probability and a normal D-dimer test had a negative predictive value of 99% and this combination occurred in 44% of the study sample. Ginsberg et al also looked at the subgroup of patients with a non-diagnostic VQ scan (low or intermediate probability) and a normal D-dimer test and found this combination had a negative predictive value of 97%.

In another important, recent study, D-dimer levels were assayed by a rapid ELISA test in 918 consecutive patients undergoing PE evaluation.<sup>7</sup> A normal D-dimer concentration (< 500 mcg/L) ruled out venous thromboembolism in 31% of the cohort with a negative predictive value of 99%. We are cautiously optimistic that there may be a role for D-dimers in the ED, particularly in the subgroup of patients with a low pretest probability or in other groups when combined with additional tests.

### **Spiral CT**

Advances in CT technology have made spiral CT an exciting, alternative modality for evaluating PE. Spiral CT allows continuous volumetric image data acquisition during a single breath hold. If scanning is timed appropriately after contrast injection, there is excellent visualization of the pulmonary arteries and an embolism will appear as a filling defect in the center or periphery of the artery. In more peripheral (segmental and subsegmental) arteries, a clot can completely occlude or even enlarge an artery,<sup>8</sup> making it more difficult to visualize or distinguish from bronchial lymph nodes.

A primary advantage of spiral CT is that it images many important chest structures and other potential diagnoses can be assessed. In many hospitals, spiral CT is more readily available than VQ scanning on a 24-hour basis. Finally, CT is cost competitive with other modalities; the charge for a spiral CT is often less than that for a VQ scan.

Several studies have compared spiral CT with angiography, and most have shown an overall sensitivity in the 85-100% range with a specificity in the 78-100% range.<sup>9-11</sup> Many reports have also shown spiral CT to have a much higher sensitivity for central clot than for peripheral clot. In one recent study, the overall sensitivity was 86% but when subsegmental emboli were included, the sensitivity fell to 63%.<sup>11</sup> However, the clinical significance of isolated subsegmental emboli is not at all clear. Isolated subsegmental emboli occurred in only 5.6% of patients in the PIOPED study and the inter-observer agreement for detecting them on pulmonary angiography was only 66%.<sup>2</sup> More importantly, it may be that small peripheral emboli in patients with good cardiopulmonary

reserve are of little consequence when there is no evidence of proximal DVT in serial ultrasound studies of the lower extremities. This important concept of assessing for the risk of recurrent emboli, in addition to looking for evidence of significant emboli in the lungs, is the rationale behind the success of outcome studies that have tested the strategy of withholding anticoagulation in patients with a nondiagnostic VQ scan and a negative bilateral lower extremity ultrasound.<sup>12,13</sup> We are optimistic that large scale outcome studies combining spiral CT with ultrasound may show this strategy to be equally or more effective than algorithms using VQ scanning.

There are potential disadvantages to spiral CT that must be considered. First, for patients who are allergic to intravenous contrast or who have renal insufficiency, spiral CT may not be the test of choice. Second, a spiral CT study to evaluate PE requires interpretation by an experienced radiologist. Third, no outcome studies have been published to date that have evaluated a testing strategy using CT alone or in combination with ultrasound without VQ scanning. One study used spiral CT instead of pulmonary angiography in 164 patients in an algorithm where the patients had already had an intermediate probability VQ scan and a negative bilateral duplex ultrasound.<sup>14</sup> In the 112 patients who had a negative CT, anticoagulation was withheld and the incidence of venous thromboembolism was 5.4% at three months follow-up. There is a pressing need for large, prospective studies to determine the outcome of patients in whom anticoagulation is withheld after a negative CT scan (with or without other studies such as ultrasound or D-dimer testing), but primarily replacing VQ scans early in the algorithm.

### **Magnetic Resonance Angiography (MRA)**

Nonangiographic MRI has the ability to demonstrate PE as intravascular filling defects on cross-sectional images. However, early results were poor due to interpretation problems including those caused by respiratory-motion artifact, lack of contrast between in-plane blood flow and an embolus, and signal intensity loss peripherally. Fortunately, there have been several key innovations in MR hardware. It is now possible to produce fast, three-dimensional images, which, when combined with dynamic gadolinium enhancement, allow high-resolution angiography to be performed in a single arrested breath.

Meaney and associates reported the results of a small prospective trial that compared gadolinium-enhanced, three-dimensional magnetic resonance angiography (MRA) to the gold standard of conventional pulmonary angiography in 30 patients with suspected PE.<sup>15</sup> Enrolled patients received both studies, which were

reviewed independently by three radiologists blinded to the study hypothesis. The diagnostic criterion for PE was either the presence of an intravascular filling defect or a trailing embolus sign. In eight patients with emboli proven by pulmonary angiography, all five lobar and 16 of 17 segmental emboli were identified by the MRA technique. The three sets of readings demonstrated sensitivities between 75% and 100% and specificities between 95% and 100%.

More recently, Gupta and colleagues demonstrated less positive results than those of Meaney et al comparing standard pulmonary digital subtraction angiography to three-dimensional MRA in diagnosing PE.<sup>16</sup> Though the studies were designed similarly, differences in sensitivities and specificities occurred because the Gupta study attempted to extend the diagnostic ability of the MRA technique to detect subsegmental emboli. The results reaffirmed the accuracy of three-dimensional pulmonary MRA to depict lobar and segmental emboli, but also demonstrated the technique was unable to depict 80% of subsegmental emboli.

The controversy regarding the clinical significance of subsegmental emboli is the same for MRA as for CT scan, and has been discussed above. Certainly, continued advances in pulmonary MRA techniques will improve detection of subsegmental emboli. However, what to do with this information clinically will depend on large, prospective, clinical outcome trials.

Visualizing clots in the pulmonary vasculature using MRA has a few significant advantages over CT. First, with the use of non-iodinated contrast agents such as gadolinium, which are not nephrotoxic, MRA can be utilized in patients with iodinated contrast allergy and renal insufficiency. Second, MRA avoids ionizing radiation and can be safely used in pregnant patients. Third, MR venography of the legs and pelvis for evaluation of DVT can be combined with pulmonary vascular imaging to provide an assessment of clot burden at several sites within a single examination in under one hour.

There are several disadvantages to MRA. MR scanning takes somewhat longer than CT scanning, and poses some difficulties due to remote patient monitoring, especially for acutely ill and unstable patients. Also, the ability to scan patients with morbid obesity, claustrophobia, or metallic implants is limited. The cost-effectiveness of MRA for the diagnosis of PE remains unknown. At many institutions, MRA is associated with significantly higher charges than for either CT or VQ scan. MRA is not widely available and requires expertise that is not routinely available 24 hours/day. Finally, there are no prospective outcome trials to evaluate a

clinical strategy where patients with negative MRAs are sent home without anticoagulation.

## Conclusion

It is very likely that our approach to the diagnosis of PE will change substantially in the next five years. We are optimistic that spiral CT has the potential to replace VQ scanning as the initial diagnostic test in many PE algorithms. MRI appears to have equal or greater potential as an effective test, especially by providing information about clot in both the lower extremities and the lungs. However, the cost, lack of availability, and expertise required may prevent MRA from assuming a primary role in most EDs. Rapid ELISA D-dimer testing has already been introduced in some ED settings and may be used cautiously in patients with a low pretest probability for thromboembolic disease, or in other patients in combination with additional noninvasive tests. (Dr. Schears is Assistant Professor of Emergency Medicine, Department of Emergency Medicine, Hospital of the University of Pennsylvania.) ❖

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## CME Questions

27. Which of the following is true regarding the management of COPD exacerbations?
  - a. Oral corticosteroids are rarely, if ever, indicated.
  - b. Oral corticosteroid therapy obviates the need for anticholinergic therapy.
  - c. There are no significant side-effects to a two-week course of steroid therapy.
  - d. Oral plus inhaled steroid therapy is more effective than inhaled steroid therapy alone.
28. Oral corticosteroids for the treatment of COPD exacerbations:
  - a. are useful only when given in fast-taper fashion.
  - b. have replaced antibiotics in the management of COPD.
  - c. may cause significant hypocalcemia.
  - d. may cause significant hyperglycemia.
29. In young febrile children with a UTI, all of the following are correct *except*:
  - a. therapy with oral antibiotics is not as effective as IV therapy.
  - b. *E. coli* is the most common causative pathogen.
  - c. a history of emesis does not preclude oral antibiotic therapy.

d. pyelonephritis is present in more than one-half of these cases.

30. A reasonable oral antibiotic for the initial care of febrile young children with UTI is:
  - a. ciprofloxacin.
  - b. ampicillin.
  - c. cefixime.
  - d. azithromycin.
31. All of the following are true concerning the diagnosis of PE, *except*:
  - a. a positive D-dimer level is a very specific test with a high positive predictive value to rule-in PE.
  - b. both spiral CT and MRI have a much higher sensitivity for central clot than for subsegmental (peripheral) clot.
  - c. the clinical significance of isolated subsegmental emboli is currently debated.
  - d. one advantage of MRI is the ability to look for clot in both the lungs and in the lower extremities in a single examination.
32. The D-dimer test:
  - a. is more sensitive when done by latex agglutination than by ELISA.
  - b. is highly specific for pulmonary embolism.
  - c. offers help in excluding the diagnosis of pulmonary embolism due to its high negative predictive value.
  - d. is invalid in patients with gout.
33. Which of the following is a correct pairing of diagnostic test with its related significant limitation in the diagnosis of pulmonary embolism?
  - a. MRA and high fetal risk
  - b. spiral CT and risk of nephrotoxicity from intravenous contrast
  - c. D-dimer assay and patient consent
  - d. spiral CT and prolonged scanning time
34. Spiral CT for diagnosis of pulmonary embolism:
  - a. requires no intravenous contrast.
  - b. is most sensitive for subsegmental emboli.
  - c. requires little radiologic expertise for interpretation.
  - d. is helpful in that it images other chest structures, which may provide alternative diagnoses.
35. In the study by Rao et al on plain film radiography in suspected acute appendicitis:
  - a. plain abdominal films are low yield.
  - b. plain abdominal films are recommended if the ultrasound is negative for appendicitis.
  - c. an appendicolith was seen in 37% of cases of appendicitis on the plain film.
  - d. plain films of the abdomen fared better than appendiceal CT with regard to cost-benefit analysis.

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## An ECG Clue to a Valvular Lesion

By Ken Grauer, MD

### Clinical Scenario:

The ECG in the figure was obtained from an 80-year-old woman who presented with "fatigue." What valvular lesion should be carefully listened for in view of the findings seen in this tracing?

### Interpretation:

The rhythm is irregularly irregular, and atrial activity is absent. This defines the rhythm as atrial fibrillation—in this case with a controlled ventricular response. The

QRS and QT intervals are normal. The mean QRS axis is  $+80^\circ$ . There is no evidence of left ventricular hypertrophy (LVH). There are minimal, nonspecific ST-T wave abnormalities present that do not appear to be acute.

Other than the rhythm, the most remarkable finding on this tracing is the presence of a tall (and clearly predominant) R wave in lead  $V_1$ . This abnormal finding that should always suggest consideration of five possible diagnoses:

1. Right bundle branch block (RBBB)
2. Wolff-Parkinson-White (WPW) syndrome
3. Posterior infarction
4. Right ventricular hypertrophy (RVH)
5. Normal variant

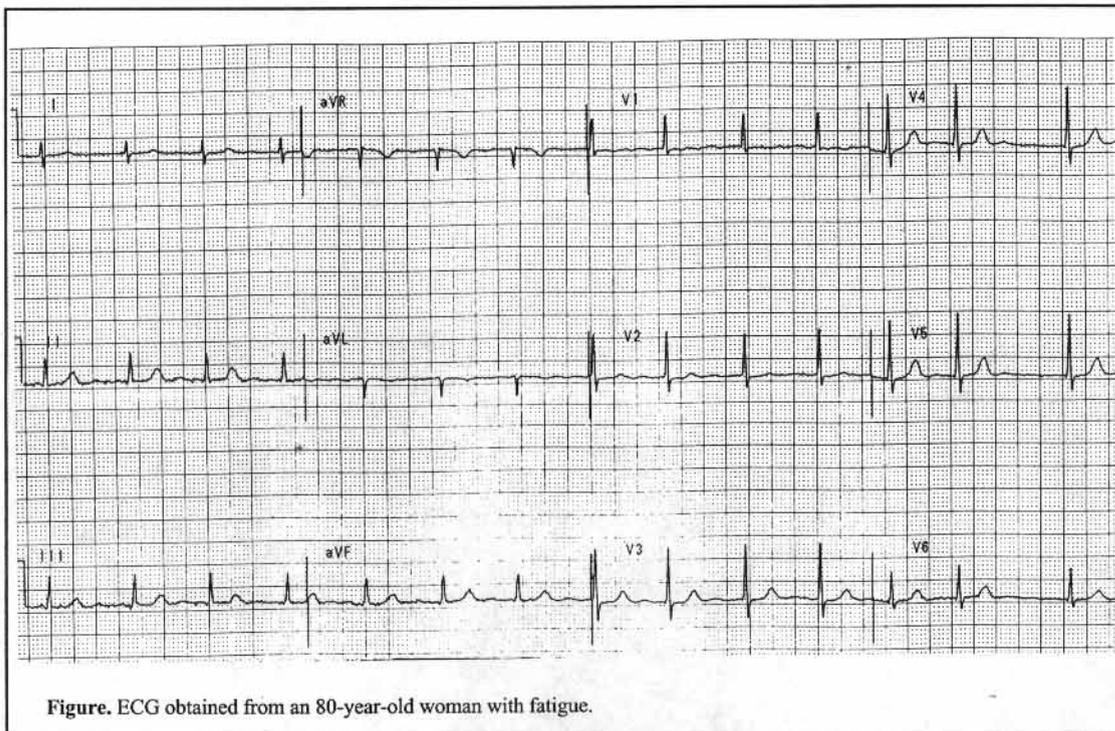


Figure. ECG obtained from an 80-year-old woman with fatigue.

In this particular case, the first two entities in the above differential list can be excluded because the QRS complex is narrow. This ECG is clearly not a normal variant. Posterior infarction almost always occurs in association with evidence of inferior infarction (since the right coronary artery most often provides the blood supply to both of these areas of the heart). There is no indication of inferior infarction in this tracing. Therefore, by the process of elimination, a diagnosis of RVH should be strongly suspected as the cause for the tall R wave in lead  $V_1$  of this ECG. The finding of a nearly vertical QRS axis and persistent S waves in lateral precordial leads is consistent with this diagnosis.

The valvular lesion that should be suspected with the ECG finding of atrial fibrillation and RVH is mitral stenosis. ❖

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**Laryngeal Mask Airway in Patients Who Cannot Be Intubated**